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The Treatment of Cane Setts with Mercurial Solutions.

By C. G. HUGHES and G. A. CHRISTIE.

Introduction.

THE cut ends of setts in the ground make ideal breeding places for the soil-inhabiting fungi and other rotting organisms, especially when conditions are not entirely suitable for the germination of the buds. The soil may be too wet or too dry or the soil temperature too low and while the buds are awaiting a stimulus to germinate, the fungi can penetrate the sett and destroy the stored food in it. The buds will then die and a gappy stand, or even a complete failure results. A poor strike means a loss to the farmer in many ways and he usually does everything humanly possible to avoid it.

It has been found within recent years that dipping the cut setts in a solution of a mercurial compound ensures protection for some weeks against the invading soil fungi. During this period the buds will come away, and when finally the fungi do destroy the sett, the new plants are already independent and flourishing on their own roots. In the experimental stages it was a simple matter to treat small amounts of plants in bags or baskets man-handled into and out of the solutions but with the application on a farm scale, something more elaborate and capable of handling larger quantities of plants was called for. Farmers in the Inkerman area, and to a lesser extent on the northern side of the Burdekin River, have suffered from poor strikes for many years; some farms have been so notoriously bad in this respect that their capital value has been depreciated to a marked extent in comparison with the more fortunate farms in the area. It is not surprising then that the farmers in the Ayr district, ably assisted by the local smiths and engineers, have taken the lead in the development of equipment for treating setts on a large scale. Before proceeding to a discussion of the equipment already in use a brief mention may be made of the experimental work which has been carried out on the Burdekin, and of the method of preparation of a satisfactory dipping solution.

Experiments in the Burdekin District.

The demonstration plantings in 1947, 1948, and 1949 showed beyond a doubt the value of a mercurial treatment in promoting a good stand. During the first two years particular attention was paid to the Inkerman Down River farms, but the 1949 plantings were made over a wider area and on both sides of the Burdekin River. The results obtained were remarkable and farmers have been so impressed that many are adopting the dipping treatment as a standard practice for all their plantings, even though it has meant a reversion to the drop-planters.

It has been impossible to arrange for experimental plantings in the checker-board style made familiar to farmers by Bureau variety and fertilizer trials, chiefly owing to the understandable objection by the farmers that they did not want the untreated control plots, which they knew were going to fail, scattered about their fields. It was necessary then to have untreated rows running right through the fields, with similar strips treated with mercurial preparations. It was possible to obtain germination counts and it was obvious that the mercurals gave a speedier and better germination, but the form of these trials did not allow comparison of tonnage yields from the respective strips. There were two reasons for this: firstly, the strips were generally only a few rows wide and comparable yields cannot be obtained from narrow plots, owing to the large effects on the border rows and, secondly, the effect of the replanting in the untreated rows could not be assessed. The important point is that even if the untreated plots did yield nearly as well as the treated—it could never yield more—the treatment is still a good investment because (1) a stand is assured providing the plants are good and the soil is in reasonable tilth, (2) there is less expense in early cultivation and weeding and (3) the weight of cane planted per acre can be appreciably reduced.

Counts of shoots through the ground are made in all the germination trials and the figures have shown the superiority of the treatments in practically every instance, particularly when soil temperatures are low. However, the figures obtained are not important in themselves, what really matters is whether a complete stand has been obtained, or whether a farmer has to waste time and money planting misses or even replanting the entire field. The photograph (Fig. 31) shows the spectacular result which can be expected in a year of poor germinations such as this has been. The photograph was taken on 26th July, 1949, just nine weeks after planting. The four treated rows had then completed germination whilst the rest of the block showed odd shoots—only two shoots were seen in one 100 ft. section of row—and would never be a complete stand because many of the setts were dead. This striking demonstration of the efficacy of the treatment comes from a good, heavily producing farm at Airdmillan on the Ayr side of the river. The variety is Badila.

Figure 32 shows the difference between treated and untreated rows on an Up River farm in the Inkerman mill area. The cane had been planted nearly eleven weeks before and the gaps in the control plots would have to be replanted.

FIG. 31.—Effect of dipping on cane germination. Rows on right were dipped in a mercurial solution while those on the left were untreated.

The Preparation of the Dipping Solution.

In a previous article in this Bulletin (October, 1948, pages 54-58) three proprietary brands of mercurial compounds were mentioned as being suitable for the dipping solution. Results from a further season's experiments have indicated however that, whilst each of the mercurials gives better results than no treatment at all, these mercurials differ as between each other in their effect and that a new mercurial may be worth a trial when it is put on the market here. When this work on the field treatment of plants was initiated it was felt that the

FIG. 32.—Results of dipping on another farm. Rows on left were not dipped in a mercurial solution.

demand might never warrant the production of a special compound for cane in Queensland and so tests were carried out with the mercurials readily available at the time. These were "Aretan," "Ceresan" and "Agrosan." Aretan, which contains three per cent. mercury in an organic combination, is designed for the solution treatment of potatoes, bulbs and corms, &c., and goes readily into solution. It is priced at 84s. per 7 lb. tin in Brisbane and although containing twice as much mercury as the other two preparations, is still more expensive per unit of the active ingredient. Ceresan contains 1·5 per cent. mercury and is used primarily as a dust for the treatment of cereals against seed-borne fungal diseases. It costs 25s. 8d. per 7 lb. tin. Agrosan has the same mercury content as Ceresan and, like it, was developed for the dusting of seeds prior to sowing; it does not mix readily with water owing to the large proportion of insoluble carrier. It retails in Brisbane at the same price as Ceresan.

Although results were satisfactory with all three and also with "Abavit S.," a soluble preparation especially developed in England for the treatment of cane setts but not yet commercially available, results from a large number of trials indicated that Aretan was the most suitable for use in Queensland. Ceresan was in general almost as good but Agrosan did not appear as effective as the others. Abavit S. shows promise but has not been tested on a commercial scale.

The solution for dipping should contain ·015 per cent. mercury which may be obtained by dissolving ½ lb. of Aretan or 1 lb. of Agrosan or Cresan to each 10 gallons of water. The required quantity of mercurial should be mixed into a paste with a small amount of water before adding to the bulk of water, so that it will all be dissolved. Care should be exercised however that this poisonous paste does not get onto the hands as it will cause serious blisters (see Quarterly Bulletin, January, 1949, pages 126-127) which may lead to a general mercury poisoning. The diluted solution is still poisonous to stock if drunk but will not have any ill-effects on the skin of the forearms and hands of the average person.

The solution will keep for several weeks and when finished with may be disposed of by running out onto the ground, where the soluble mercury compounds are very shortly made insoluble and non-poisonous by the soil micro-organisms.

Treatment of Setts in the Burdekin District.

It is the misfortune of the Burdekin district that it is, as a whole, more subject to poor germination through soil-borne diseases than any other area in the Queensland cane belt, and in the notorious areas a second or even third complete replanting of fields was common before a satisfactory stand resulted. With a shortage of fertilizer rendering ratooning unprofitable, this meant that the cost of the multiple plantings all had to be borne by the one plant crop. It was so serious that several farmers have stated that they would no longer be on their farms had the mercury treatment not been brought to their notice. As in other districts the average germinations obtained vary from season to season but every year certain farms or even certain fields on some farms give poor germinations and in a bad year poor strikes are common throughout the area. The planting is always done as soon as possible after the end of the wet season. Should this season

finish early and the land be workable during late summer, fields will be planted by the end of March, i.e., while the soil is still warm, and plants of most varieties then come away very quickly. Floods on the Inkerman or southern side of the river, however, frequently delay the planting and in some seasons such as this, the wet-season rains last for so long that very little planting anywhere in the district is done before May. The soil is then cooling and it remains cold while the crop is attempting to establish itself. Pineapple disease and other diseases in the soil can thrive under these conditions and widespread poor strikes result.

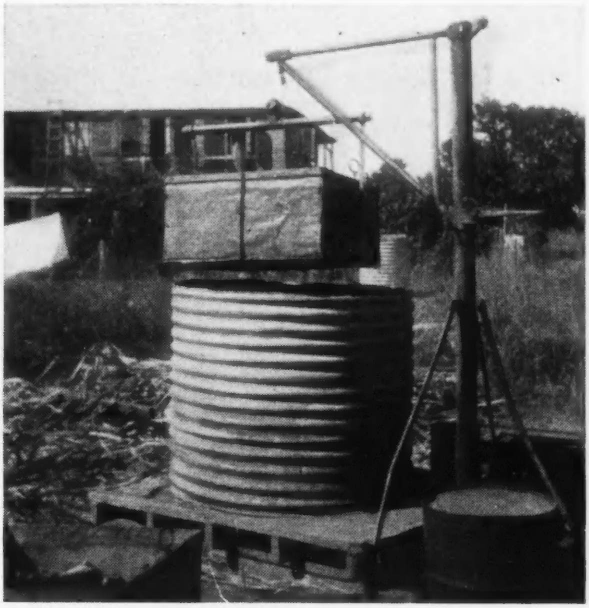

Fig. 33.—A simple type of small scale dipping plant. The galvanized iron basket has a perforated bottom for drainage. The use of galvanized iron is not recommended for these plants unless thoroughly coated with a bitumastic paint.

Many farmers feared such a happening this year when they realized their plantings would be six weeks later than usual and, in addition, regarded the dipping of plants as a sound insurance, so that a substantial area was planted with treated setts. In the Inkerman area alone, 18 farmers dipped setts for a total of just under 500 acres. Even a greater number of farmers had failures in their first plantings and borrowed dipping plants from their more far-sighted neighbours to treat more than 200 acres of replants. It is impossible to assess the area replanted without treatment or to obtain a total for the very large area in which supplies were planted after dipping in a mercurial solution. Some of these fields which were supplied could more profitably have been ploughed out as many of the supplies amounted to almost half the tonnage originally planted.

On the Ayr side of the river, plantings can usually be made at a time when conditions are favourable but even so there are several farms where poor strikes are common, and in certain seasons the complaint may be district-wide. This year two farmers treated nearly all their plantings, a total of 62 acres, with very gratifying results and several others treated the supplies, which were often very heavy. Several growers are determined to avoid these serious losses and have made arrangements to dip all their plants next year.

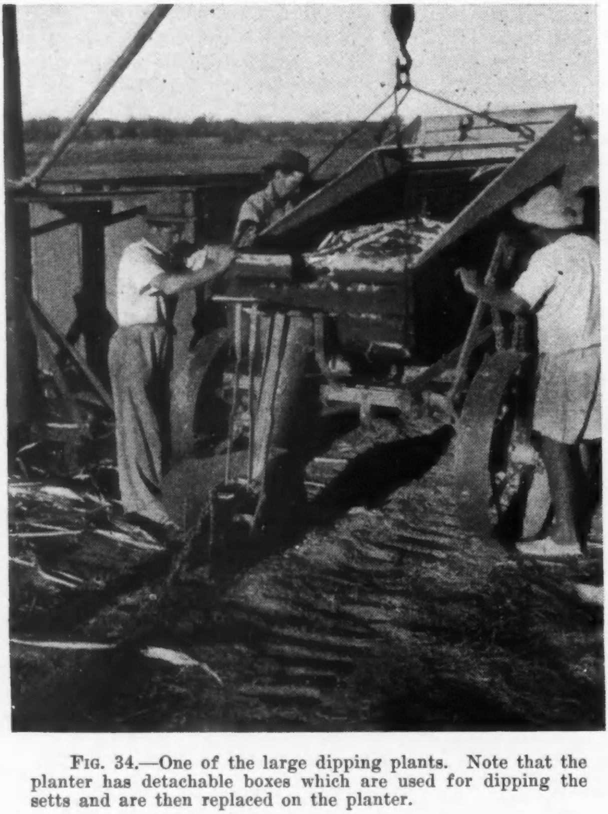

FIG. 34.—One of the large dipping plants. Note that the planter has detachable boxes which are used for dipping the setts and are then replaced on the planter.

The technique used by different farmers varied from a simple dipping by hand to the dipping of whole planter-box loads lifted by powerful winches on a stout crane. The simple methods involved considerable labour and back-breaking work but shortage of metal prevented several farmers from obtaining the dipping plants they required. The very simplest form consists of baskets made of strap-iron and wire netting and fitted with metal handles. A basket holds about one bag of plants and several are in operation with the one corrugated-iron tank so that there is the minimum delay in filling the planter box with treated setts. If the drills be so long that the planter will not do the round on one filling, a tank is installed at each end.

The plants are cut into the basket which is put by hand into the solution. It is left there anything from 30 seconds to several minutes (even an immersion of two or three hours would not do any harm), lifted up, allowed to drain and then emptied. Although this work is very heavy six farmers found it worth the labour involved and between them treated 160 acres.

Except for the smaller-than-average farmer there should be no reason why the laborious basket system should be persevered with and farmers in collaboration with Bureau extension officers and the

FIG. 35.—Same dipping plant as Fig. 34. Detachable planter box full of treated setts being lowered into position on planter frame.

local tradesmen have evolved several types of plants capable of handling quite large areas. The simplest of them is shown in Fig. 33. The basket is made of galvanized iron with perforations in the bottom and holds five to six bags of plants. It can be tipped readily to empty and is lifted by a simple crane working directly from a hand-driven windlass. The tank consists of $1\frac{1}{2}$ sheets of an ordinary 1,000-gallon domestic galvanized-iron tank which, with the crane, is mounted on a slide. It is a simple set-up suitable for a small team and has been used this season for planting 57 acres as well as supplying misses for many acres. It is cheap and can be made from scraps commonly found (in normal times) on most farms. It would not last as long

as the heavier plants and there would be some delay in loading a large planter-box but this type of plant should fulfil a useful purpose on many farms.

The plant shown in Fig. 34 and 35 is much more substantial and the 1,000-gallon steel tank should last a lifetime. The wire rope is tied to a tractor or truck for lifting the load of plants which are contained in a detachable planter-box. Fig. 34 shows a full planter-box being lowered into the tank. Three boxes are provided so that at any given time there is one on the planter, one in the tank or draining and one on the ground being filled with cut setts. Fig. 34 shows the planter frame waiting for the full box and Fig. 35 the box being easily and quickly lowered into place. This is a good set-up with a minimum delay in loading the planter but the necessity to use a tractor or truck for lifting the box is a disadvantage and the small-diameter rollers are not suitable for moving over ploughed ground. Photographs of a similar plant in action in 1948 were published in the October, 1948, number of this Bulletin.

The most ambitious type of dipping plant consists of a 1,000-gallon steel tank with a crane operated through a geared windlass (see Fig. 36 and 37). It is mounted on four wide wheels with a swivelling front axle and provision for running over broken irregular ground without causing any twisting of the chassis. The plant is usually operated with about 600 gallons of solution in the tank and is then quite mobile over farm headlands. The baskets are a convenient type. Each holds, when full, about 16 bags, i.e., sufficient for 40 chains of drill. They are equipped with a special dropping device by which a pull on a lever allows the two flaps forming the bottom to open and so release the setts into the waiting planter. It was found that the wet setts slithered over each other in their fall from the box and there was no evidence that any buds were damaged. Occasionally a long sett would stick against the iron cross-bar but any baskets made in the future will not have this bar and there will be no hindrance to the free emptying of the basket. With this plant operating to capacity the bottle neck was the speed of the planter and with a suitably balanced team of men several planters could be served at once at a lower cost per planter. This plant cost more than £200 but there is no doubt that it would have been cheaper had not shortage of steel forced the manufacturers into a good deal of expensive improvisation. Fig. 36 and 37 show the plant in action and the structure of the baskets can be clearly seen.

The Economics of Sett Treatment.

In areas where good strikes are the exception in most years, the installation and use of a dipping plant would be justified even if it added considerably to the cost of the original planting. Handsome dividends would accrue in the money saved by not having to supply extensively or replant, which are both very expensive and annoying operations. In most parts of Queensland, however, good strikes are the rule, providing the land has been well prepared, the temperature and moisture are adequate and the germinating habits of the particular variety have been considered, and in these instances any extra expense at planting would not be economically justified. It comes as a pleasant surprise then to find that the insurance provided by dipping can be obtained at no extra cost if the area to be planted be sufficiently large to justify the use of an efficient dipping plant. Before discussing the relative costs of the planting operations with and without dipping

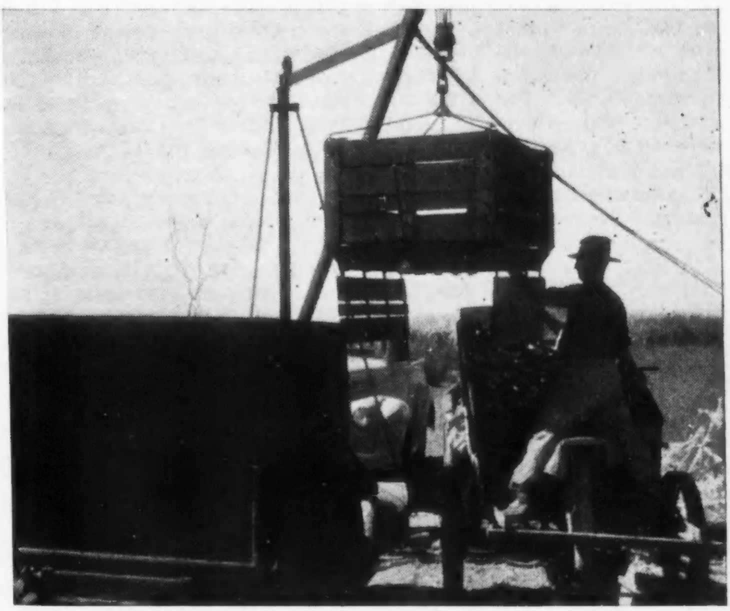

FIG. 36 and 37.—Another type of dipping plant. The dipping boxes have hinged bottoms which, after the plants are dipped and drained, open to allow the plants to fall into the planter. The lifting mechanism is winch operated.

it should be pointed out that the dipping method makes imperative the use of a drop-planter, whereas without dipping either a cutter- or drop-planter may be used. It is not intended to weigh here the relative merits of the two types of planters—some farmers consider that the financial advantage of the cutter is more apparent than real —and comparisons will be made only on the basis of the drop-planter.

Disregarding allowances for depreciation on the tractor, planter and truck and other miscellaneous expenses incurred whether the setts be dipped or not, it would cost approximately £428 to plant 40 acres with a drop-planter. The required team of eight men would plant at the rate of five acres a day, so costing £128 for the 40 acres, and 100 tons of plants at £3 per ton would be used. In comparison, the planting of 40 acres with dipped setts would amount to £399 or £407 (depending on the mercurial used) as set out in the table below :—

		£
Labour	9 men for 7 days	126
Plants	80 tons at £3	240
Depreciation on dipping plant ..	10 per cent. on £200 ..	20
Cost of Mercurial	..	13–21
		£399–407

A team of nine men is required for the dipping-planting: three men cutting and carting, four stripping, cutting plants and dipping, one on the tractor and one on the planter. The quantity of setts can be reduced to two tons per acre compared with at least two and a-half tons for the undipped, owing to the increased germination obtained. In parenthesis may be mentioned the case of one farmer who halved the quantity planted to 1¾ tons per acre when he dipped, and obtained excellent stands. The extra man, the reduced tonnage planted and the speed with which the planter is loaded by the large-basket or detachable-box equipment all lead to an increase in the rate of the planting and it is usual to be able to plant an extra acre per day. This means that only seven days instead of eight are required to plant 40 acres. Depreciation on a £200 dipping plant has been allowed for at the rate of 10 per cent. and costs of the mercurial are set down at £13 to £21. The lower figure represents the cost of 70 lb. of Agrosan or Ceresan, i.e., sufficient for 700 gallons of dip; the equivalent amount of Aretan would cost £21. It is worth noting that the cost of the mercurial represents only five per cent. or less of the total cost of planting and the difference in price between the cheaper mercurials and the Aretan is only 4s. per acre.

Conclusion.

There is no doubt that the treatment of setts with a mercurial dip prior to planting has come to stay in the Burdekin district and as the advantages to be gained by treatment are weighed against the possibility of poor strikes the practice is certain to spread to other mill areas particularly on the larger farms in the north, where late autumn planting, i.e., before the mills start crushing, is so desirable.

A Bureau farm bulletin on the treatment of setts with mercurials is being prepared and should be available within the next few months.

Recent Varietal History and Seedling* Programme for the Mackay District.

By J. H. BUZACOTT.

Introduction.

IN most sugar cane growing areas of Queensland vast changes in the varieties grown have taken place during recent years. Hughes [2] [3] has already discussed such changes in the Bundaberg and Ingham districts in papers presented to this Society, whilst the same author [4] and Elliott [1] have given details regarding the varietal changes in the Mackay district. The latter papers did not appear in the Proceedings of this Society and it is the present writer's intention to give in this communication much of the information included in them, together with an outline of the present and proposed seedling programme for the Mackay district.

The varietal "revolution" as Hughes (*loc. cit.*) so aptly terms it, has been very little less pronounced in the Mackay district than in other cane growing districts of Queensland; however, it presents one essential difference. Whereas in Bundaberg the most marked change was the replacement of the old and noble canes by two introductions, P.O.J.2878 from Java and Co.290 from India, and in Ingham the change consisted largely of the replacement of noble canes by the C.S.R. bred Trojan, Eros and Pindar, in Mackay the revolution has been practically entirely towards varieties produced by the local Sugar Experiment Station. The greatest change in this respect has occurred during the past five years. By inspection of Table I., which represents the composition of the 1942 and 1947 crops in the Mackay districts tabulated on the basis of country of origin of the varieties, it will be seen that Queensland bred varieties during the short period have jumped from 23 to 60 per cent. of the crop.

TABLE I.

COMPOSITION OF 1942 AND 1947 MACKAY CROPS ON THE BASIS OF COUNTRY OF ORIGIN OF VARIETIES.

1942.		1947.	
Country of Origin.	Percentage of Crop.	Country of Origin.	Percentage of Crop.
Mauritius	34·4	Queensland	60·02
Java	25·1	Java	22·4
Queensland	23·45	Mauritius	7·7
India	9·8	India	7·3
New Guinea	6·7	New Guinea	2·3
West Indies	·05	West Indies	·01
Unclassified	·5	Unclassified	·27

The broad term "Mackay district" is taken to embrace the cane growing area from Carmila in the south to Proserpine in the north, a district which is served by eight sugar mills and which in favourable years produces approximately one-quarter of the total Queensland crop.

* Paper presented at the Mackay Conference, Q.S.S.C.T., April, 1949.

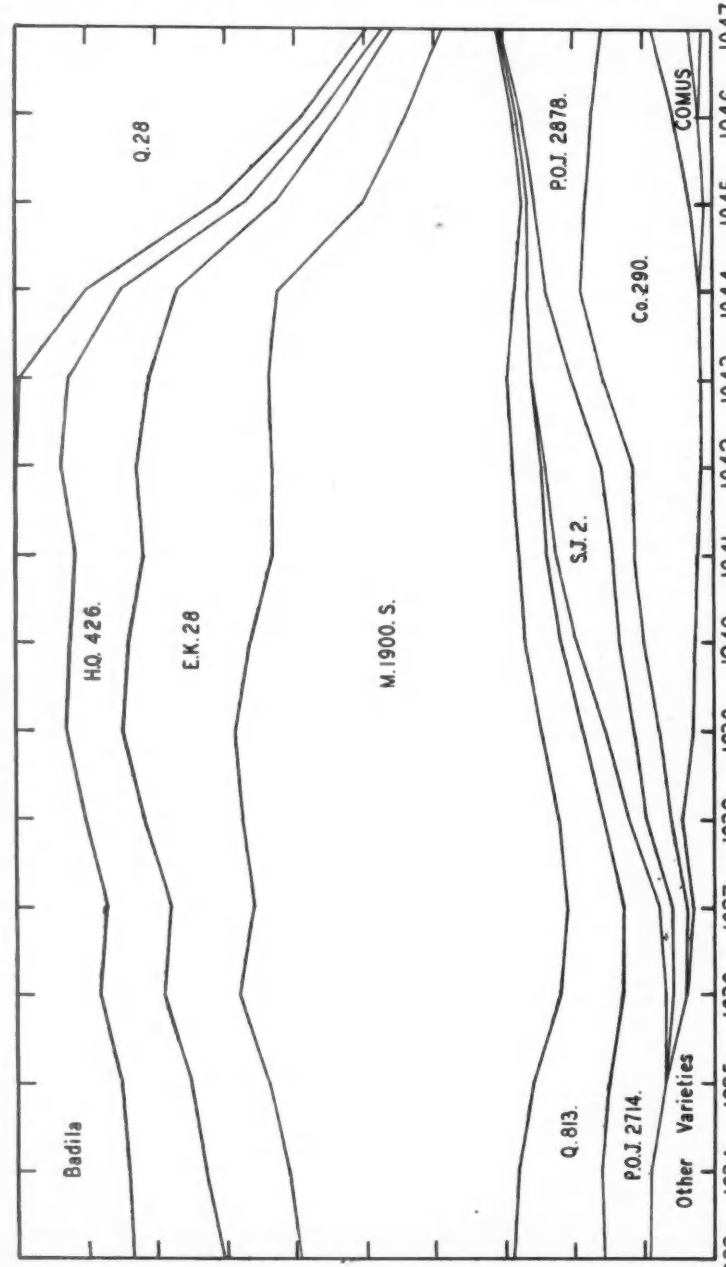

FIG. 38.—Illustrating graphically the varietal changes in the Mackay district from 1933 to 1947.

Varietal Changes.

The graph taken from Elliott (*loc. cit.*), and reproduced herewith as Fig. 38, shows clearly the varietal changes which have taken place during the fourteen years from 1933 to 1947. It is noteworthy that for eleven of those years M.1900 Seedling was the unchallenged major variety and until 1945 it never fell below 30 per cent. of the total crop. At its maximum in 1936 it constituted 46 per cent. of the total. M.1900 Seedling was the favoured variety for the forest soils of Mackay, and it was not until 1942 that a Mackay bred variety, Q.28, which was later to challenge successfully the supremacy of M.1900 Seedling, appeared on the list of approved varieties. Q.28 made an extremely rapid advance so that by 1947 it assumed the proportion of 50 per cent. of the total Mackay-Proserpine crop. This occurred largely at the expense of M.1900 Seedling. It is believed that Q.28 has already passed its maximum since two factors are already operating toward its decline. The first of these is the production, also at the Mackay Experiment Station, of another high-yielding variety for the forest soils. This variety is Q.50, and by virtue of the fact that a large percentage of the plantings in the Mackay district during 1948 were of Q.50 it seems logical to assume that the importance of Q.28 must rapidly decline. No doubt the plantings of Q.50 were made largely at the expense of Q.28, M.1900 Seedling, and Co.290. The other factor operating against Q.28 is the appearance of variations in its primary vigour, apparently either physiological or pathological in nature, which have affected some plantings. These variations are discussed by McDougall, Steindl and Elliott [6] and efforts are being made to seek the cause of the trouble, but have so far not met with success.

Q.28 was grown as a seedling at the Mackay Sugar Experiment Station from seed produced at Meringa in the year 1935. This seed was of the parentage Co.290 × Q.1098. The story of the early promise and rapid expansion of the seedling later to become Q.28 was told by Hughes [5]. Briefly, it is a good striker and ratooner which covers in fairly rapidly and under most conditions remains erect. It is well suited to the shallow forest soils of the Mackay district, but on the deeper alluvial soils its growth is too rank. In common with most wild-blooded canes the sugar content is rather low early in the season, but it attains good sugar from mid-season onwards.

The great popularity of Q.28 is indicated by its advance from a single stool in 1936 to a production of 439,038 tons in 1946. Although the percentage of Q.28 reached a peak in the Mackay district in 1947, the tonnage produced, due to an unfavourable season, was less than the previous year by over 100,000 tons, and with the present rapid rise of Q.50 it is unlikely that Q.28 will again approach the 1946 tonnage.

With regard to the other varieties shown on the chart, Badila has suffered a steady decline and now supplies an almost negligible proportion of the crop. The production of E.K.28 steadily increased from approximately 11 per cent. in 1933 to a peak of 19·5 per cent. in 1942, but from that period it also waned in popularity until in 1947 it was only 7 per cent. H.Q.426, largely on account of its early high sugar, was responsible for a steady 10 to 15 per cent. of the total crop from 1933 to 1943, when it became gradually displaced by the better ratooning and higher yielding capacity of Q.28, until the 8,600 tons grown in 1947 represented only 1·3 per cent. of the district total. Q.813, which also

provided some 12 per cent. of the crop in 1933, steadily lost favour until the plantings have become negligible. Similarly, S.J.2, which did not appear in the tonnage until 1935, reached a peak in 1941-42 and then declined to practically nothing by 1947.

The other two varieties of interest are P.O.J.2878 and Co.290. P.O.J.2878 appeared in the tonnage crushed as far back as 1935, but due to its susceptibility to downy mildew disease it was temporarily removed from the planting lists of some areas for a few years. Since its approval for the whole of the Mackay area in 1944 it has achieved considerable popularity, and in 1947 reached second place in tonnage for the district. Co.290, which first showed up in 1936, reached its peak in 1944, when it provided almost 17 per cent. of the crop, but has since declined to 7·3 per cent., largely due to the increase of Q.28, actually one of its offspring, which flourishes on similar soils.

Further new varieties to appear on the approved lists of recent years are Comus, which provided 3 per cent. of the 1947 crop; Q.45, which has been planted to some extent on the deeper soils and produced 2 per cent. of the 1947 crop; Q.50, which was not approved until 1947 and which in consequence is represented in the crushing lists for the first time in 1947 with 0.1 per cent. of the crop; and Trojan, a variety produced by the Colonial Sugar Refining Company at Ingham, which was approved for general planting in 1948 and likewise produced 0·1 per cent. of the 1947 crop. Comus is a rapid early grower but will probably never assume a major role in the district. Indications are also that Q.45 will never attain large proportions since it does not appear to be as good a variety as P.O.J.2878 on the particular soil types suited to it. Q.50, as stated earlier, is primarily a forest soil variety and it will, it is expected, to a large extent replace Q.28. Trojan, which has attained great prominence in northern cane areas during recent years, appears to be suited best to the alluvial river flats of the Mackay district and up to the present shows no promise of becoming a general purpose cane. It is anticipated that of these four newcomers only Q.50 and Trojan are ever likely to figure prominently in future tonnages.

Varietal Programme for Mackay Area.

Having reviewed the varietal situation of recent years and made brief reference to possibilities of the immediate future some mention might be made of the long range programme for the Mackay district. Generally it takes from seven to ten years to carry an original seedling through its processes of selection and trials to its final approval. Seven years can be considered a minimum as illustrated by the variety Q.28, which came from a batch of seed produced in 1935 and was first approved in some mill areas in 1942, whilst Q.50, which was a seed in 1938, became approved in 1947, a period of nine years. Consequently any seedlings which are planted during 1949 could not be expected to reach the commercial stage before at least 1956.

McDougall [6] has discussed at length the varietal requirements of the Mackay district. According to him the Mackay soil types may be broadly divided into forest and scrub soils; the former may be subdivided into shallow types often associated with poor drainage and the more fertile types on undulating country; the latter include the river bank alluvials and rich scrub pockets. Formerly one great problem in

the Mackay district was that all seedling selections were carried out on the Mackay Experiment Station, which is solely representative of the forest soils. Whilst such selection has been eminently successful for the forest soil types, as evidenced by the production of Q.28 and Q.50, it obviously has imposed serious limitations on the selection of suitable varieties for the heavier soils. This situation has been met by acquiring a site for seedling propagation on an area of fertile scrub soil. On this location original seedlings were planted during 1947, whilst a further planting was made in 1948. Selections have already been made on the plant crop of the 1947 planting and some of the types of seedlings produced showed considerable early promise. At the same time, of course, plantings of original seedlings are still being continued at the Experiment Station with a view to providing further varieties for the forest soils.

From the yearly planting of seedlings on soils representative of the two major soil types it is hoped to maintain a steady stream of new varieties suitable to the district. Experience over many years indicates that even though a high yielding variety may be obtained, which achieves great popularity, it will not maintain its pride of place for long. During recent years higher yields have been obtained by the growth of varieties containing a percentage of wild blood in place of the purely noble varieties which previously contributed the greater percentage of the crop in Queensland. In the Mackay district in 1933 less than 10 per cent. of the crop was from wild-blooded canes, whereas in 1947 no less than 75 per cent. was comprised of varieties with a percentage of wild blood. In consequence of this a large proportion of the cane seed allotted to Mackay from Meringa, where all the cross-pollination work is carried out, comes from parents one at least of which carries a strain of wild blood. A small proportion of purely noble crosses are still made and grown, but in general the varieties carrying a wild strain are hardier, better ratooners and more resistant to some diseases than the purely noble ones. Although we speak of these new varieties as wild-blooded, actually the proportion of wild blood carried is seldom greater than one-eighth; for example, Q.28 and Trojan each have one-eighth, whilst Q.50 has three-sixteenths wild blood. Moreover, of the 70 crosses allotted to Mackay during 1947 only five were purely noble, the remaining 65 representing a blending of noble with wild blood in various amounts. One difficulty that has been encountered in the replacement of noble canes by wild-blooded hybrids is that the latter are mainly late maturers. In the breeding work for the future, emphasis has been placed on the necessity for producing varieties which have a good sugar content early in the season. Most mills now commence crushing early and with varieties which do not reach a high sugar content until late in the season it has often become necessary in recent years to commence the crushing period with canes having a very low sugar content. Accordingly requests have been made for early maturing varieties. Actually it is not necessarily early maturing varieties which are required but varieties such as H.Q.426, which reach a high sugar content early in the season and which still continue to improve throughout the crushing season. With the incorporation of wild blood this objective is not easy, but it is not unattainable and much of the crossing work is now directed towards the production of such varieties.

Seed from 70 different crosses was planted at the Mackay Experiment Station during 1948 and in all some 9,000 seedlings were raised;

of these, 2,000 were planted out on the scrub soil type, whilst the remainder were planted on the Station. Many interesting crosses are represented which include different combinations with such valuable varieties as Q.50, Trojan, P.O.J.2878 and C.P. 29-116. Included among them a number of syntheses with progeny of the Turkestan cold-resistant hybrids are represented.

Of the 1947 planting the cross which offered most promise at selection time last year, both on the forest soils of the Experiment Station and in the scrub soil plot at Lansdowne Road, was Trojan × Eros. It is possible that this combination may prove too susceptible to downy mildew disease for commercial purposes, but nevertheless it gave a high proportion of well-stooled vigorous seedlings with a good sugar content and the cross will be given a thorough trial.

The allotment of seed to Mackay for 1949 will be large, since an excellent cross-pollination year was experienced during 1948. It is expected that about 100 different crosses will be available and among these is interesting new material. Q.50 appears in five different matings, whilst Pindar occurs for the first time in our crosses as a parent. Co.270, the mother of Trojan, occurs in six combinations, whilst Trojan itself is crossed with no less than twelve different varieties. Of these, Mackay will get a share of the ones considered most suitable to the district. Standard crosses for the area will also be included, such as P.O.J.2725 × Co.290, which in the past produced Q.50. Further seed with Turkestan blood will be available, whilst H.Q.426 blood is represented in many crosses with a view to obtaining varieties which possess reasonably good sugar early in the season. It is impossible within the scope of this paper to refer to all the combinations which will be sent to Mackay, but with the notable exception of one or two parents which did not arrow last year, practically every planned combination was made. There will be some disappointments no doubt from seed which does not germinate, but in spite of that there should be more than ample seedlings to fill all the area available for seedling planting during 1949.

In addition to the selection of seedlings from seed planted in the district, varieties from other districts and other countries are being continually brought in to the area and tried in the various soil types. In order to avoid disease outbreaks certain quarantine precautions have to be observed in the introduction of such varieties even from other parts of the State, and accordingly they can only be introduced in comparatively small amounts. Due to this fact a variety may attain considerable prominence in one cane growing area before it is made available on a large scale in another district. This, however, is unavoidable if serious outbreaks of disease are to be prevented. As an indication of the number of varieties which are being tested in this way Table II. shows the varieties which are either being propagated or undergoing trials in the Mackay area, together with their sources of origin.

Many of these varieties were not received in Mackay until 1948, and in consequence no statement regarding their future value can be made. It will be possible to assess their worth only after they have been tried for some years on representative soil types. Of the varieties which have been in the district for a slightly longer period, 46 N.B.4, Orion, Q.53 and several of the C.P. varieties appear quite unsuited to the area, whilst Pindar and Q.47 show some promise, the former in plant blocks and the latter both in plant and ratoon.

TABLE II.

Source of Origin of Varieties recently Introduced to Mackay District.

Source.	No. Varieties.	Varieties.
Bundaberg ..	3	Q.47, Q.49, Q.52
C.S.R. Coy. ..	11	Eros, Orion, Pindar, 33 S.N.1882, 39 S.N.3821, 36, M.Q.2717, 39 M.Q.832, 39 M.Q.841, 39 M.Q.1688, 41 M.Q.105, 41 M.Q.1129.
Hawaii	1	32/3575
India	1	Co.301
Mauritius	6	M.171/30, M.134/32, M.112/34, M.165/38, M.63/39, M.76/39
Meringa	5	B.306, B.331, B.338, D.229, Q.53
New Guinea ..	1	46 N.B.4
South Africa ..	1	N.Co.310
U.S.A.	6	C.P.29/116, C.P.29/320, C.P.34/79, C.P.34/120, C.P.36/13, C.P.36/105
	35	

Conclusion.

In conclusion it might be said that with recently released new varieties and with the hope of more to come in the near future, cane growing in Mackay during the past few years has taken a new lease of life and the district will continue to play a powerful part in the sugar production of Queensland.

REFERENCES.

[1] Elliott, J.: 1948. "Mackay Varietal Changes from 1933 to 1947." C.G.Q.B. Q'ld., July, p. 16.

[2] Hughes, C. G.: 1946. "The Varietal Revolution in South Queensland." Proc. Q.S.S.C.T., p. 66.

[3] Hughes, C. G.: 1947. "The Varietal Revolution in the Ingham District." Proc. Q.S.S.C.T., p. 103.

[4] Hughes, C. G.: 1945. Forty-fifth Ann. Report, Bur. Sug. Expt. Stns., Q'ld., p. 18.

[5] Hughes, C. G.: 1946. "The Remarkable Expansion of Q. 28." C.G.Q.B. Q'ld., July, p. 22.

[6] McDougall, W. A.: 1947. "The Soil Factor in the Selection of Varieties under Mackay Conditions." C.G.Q.B. Q'ld., Oct., p. 89.

[7] McDougall, W. A., Steindl, D. L., and Elliott, J.: 1948. "Variations in Primary Vigour in the Variety Q. 28." C.G.Q.B. Q'ld., July, p. 31.

NOTICE TO GROWERS.

For the convenience of growers the names, addresses and telephone numbers of all field staff of the Bureau are listed on the inside of the front cover. Growers are invited to submit their enquiries on all phases of sugar cane cultivation and pest and disease control to the nearest field officer or Sugar Experiment Station.

Land Drainage in Mackay Canefields.*

By C. G. STORY.

Introduction.

IN the Queensland Cane Growers' Handbook, H. W. Kerr [2] has given a concise account of land drainage under the headings of subsoil and surface drainage; and in 1935, Clarkson [1] described one type of surface drainage practised in the Mackay district. However, at any conference of agriculturists held at Mackay, discussion and the recording of practical information on surface drainage should prove beneficial, and for this reason the following notes have been compiled.

The basic aims of drainage in canefields are:—

1. To facilitate timely cultivation of the soil and to increase its warmth. Often the major part of a field is ready for immediate attention while localised wet parts remain sticky; attempts to work such uneven country create many difficulties. Wet land is notoriously cold and slow, and sugar cane thrives better in warm soil.
2. To lower the water table and promote the growth of healthy cane roots. Plant roots require oxygen from the air and if, for some days or weeks, there is an excess of soil moisture, the supply is limited. In water-logged soils, root growth is confined to the surface layer where some air is available; this restricts the healthy development of the root system, and in consequence, also the area from which food and soil moisture may be taken up by the crop as and when required for optimum growth.
3. To improve the physical structure of the soil. When a wet clay soil is drained, a slow improvement in texture is evident.
4. To help beneficial biological and chemical processes in the soil, such as nitrification.

From the agricultural viewpoint, the necessity for improved land drainage will depend on topography; permeability of soil, sub-soil and deeper strata; annual average rainfall and seasonal distribution; the reaction of the specific crop or variety to degrees of "wet-feet"; and over-all economic considerations.

Large tracts of land producing cane in the Mackay district have a surface slope of only a few inches per chain and, when unimproved, appreciable depressions are fairly plentiful. The soils on this flat country are grey alluvial and sandy loams, 4 to 10 inches in depth, overlaying impermeable clays or sandy clays containing ironstone concretions. The average annual rainfall is 65 inches, most of which falls during the summer months. When it is realised that one inch of rainfall is equivalent to some 100 tons of water per acre, and that the natural run-off from much of the low forest areas of the Mackay district is very slow or negligible, it will be appreciated that during a wet season serious waterlogging may occur. Experience over many years has shown that some artificial drainage is necessary for profitable cane growing on this type of country; also that surface drainage, although in many instances not all that might be desired, is more practical and economic than the more expensive sub-soil drainage systems.

* Paper presented at the Mackay Conference, Q.S.S.C.T., April, 1949.

Technique of Surface Drainage.

Surface drainage is based on dividing flat fields into lands or large beds, and providing regularly spaced, graded water furrows emptying into well planned, wide but shallow headland main drains. Although eventually the main arteries of all schemes are watercourses or swamps, the work to date in the Mackay district is done on a unit farm basis; collective efforts have been rare.

FIG. 39.—Two views of poorly drained fields.

The dumpy level and contour mapping for quick and accurate work are seldom employed. Preliminary work usually consists of observations by the farmer on excess surface water distribution and run off during the wet season. Positions and depths of depressions are noted, some pegging is done, and a broad scheme of main drains is worked out. Further improvements are controlled by trial and error over a number of years, and by particular requirements.

Construction of drains.—When constructing headland drains which may be 25 feet wide, the land is first ploughed to about half the depth of soil. This ploughed soil is picked up with scoops and transported to depressions. The next layer of soil is treated similarly, and sometimes, for an even fall, the drain is taken into the clay. The scooped soil in depressions and the field as a whole are levelled off with various types and combinations of implements—graders (some farm built), land levellers, and tramline or wooden drags. Some farmers consider that the work can be done satisfactorily with ploughs and other normal farm implements; others believe that with the additional use of a grader the whole operation can be completed in the first year, if the basic levels are reasonably correct. Care is taken to avoid excessive grading of high spots when the subsoil would be brought too close to the surface. If scooping and levelling are insufficient to fill depressions, broad shallow drains across the slope are constructed to remove the surplus water and deliver it on to side headlands. When soil from the main drains

FIG. 40.—A view of a "blind end" drain.

is in excess of requirements for depressions, it is spread evenly over the lower slopes. The loss of planting area to drains, &c., is not a loss in soil to the crop, and is more than compensated by better yields from the well drained fields with slightly increased or more even soil depths.

The "chain bed" of 15 cane rows is popular, but 8 to 24 rows per bed are also used; sometimes tramline harvesting, or a particular method of cultivation governs bed width. The widths of water furrows range from 7 to 15 feet, and depend to some extent on slope; the wider furrows are constructed where the fall is small and where water moves slowly. These intra-field drains also act as good fire-breaks.

After the layout has been decided the centres of both beds and water furrows are carefully marked. The beds are then gathered by commencing ploughing at the centres and throwing inwards. For the second and subsequent ploughing, a nine-feet-wide centre strip is left for later workings with bumper discs or by skim ploughing. When seed-bed preparation is finished, all beds should be reasonably flat or with only a slight camber. This induces a more even crop growth throughout the bed, since in lands with high centres the cane rows in the shallower soil adjacent to water furrows are often poorly grown. Examples of soil depth measurements in inches across settled beds

selected at random in one Mackay district are: 7½, 11, 13, 9½, 7½ (20 rows), 8, 12, 8 (20 rows), 10, 14, 10 (20 rows), and 7, 13, 7 (15 rows). This last bed has a definite crown.

Subsequent Treatment.—For the maintenance of water furrows and main drains during crop growth it is necessary to control the weed growth by bumper discing, and grading back any accumulated silt or soil. To function efficiently drains should always be kept clean and open.

After crops have been harvested from a bedded field, the stubble is ploughed out by splitting the bed and generally only the edges of the water furrows are filled with soil. Green manures may then be planted, and to preserve bed formation the total number of ploughings for complete pre-planting preparation is usually even. However, if for example only three ploughings are contemplated, the crown of the bed is filled in immediately after the first splitting; then another splitting and a gathering follow.

Modifications.—In some of the lower parts of the Homebush and other Mackay areas, two-row beds are superimposed on fairly flat 20-row lands separated by 6- to 8-feet water furrows. This secondary bedding is carried out immediately prior to planting by gathering strips, 9 feet 6 inches wide, with small-disc implements; and the bottoms of the minor water furrows are usually about three inches lower than the general level of the lands. After cropping and ploughing out, discs and drags are used to restore the fields to the permanent 20-row bed system.

During the recent succession of comparatively dry years some Mackay farmers in low areas have modified their field drainage systems by deleting lands or beds, and maintaining and servicing only the main headland drains. It is contended that water furrows which always require some attention are not necessary in well graded fields. There is no doubt that this type of field lay-out has advantages over bedding in some instances; for example, when irrigation is practised. However, records indicate that past practices are likely to be repeated in the future; many of these fields on the flat will be reconverted to beds, and bedding will come into its own.

REFERENCES.

Clarkson, F. E. M.: 1935. "Surface Drainage in the Mackay District." Proc. Q.S.S.C.T., 1935, pp. 51-55.

Kerr, H. W.: "Land Drainage." The Queensland Cane Growers' Handbook, pp. 94-98.

SUPPLIES OF SULPHATE OF AMMONIA.

For the first time since the early years of the war sulphate of ammonia supplies promise to be sufficient and early this year. Deficiencies in Australian supply have been supplemented by shipments from England and Russia. Some interest has been aroused by the latter shipment which came in bulk from Vladivostock to North Queensland. Canegrowers can anticipate receiving better supplies this year in time for application to young ratoons.

A Simple Fertilizer Distributor for Attachment to a Tractor.*

By G. CAMUGLIA.

Introduction.

IN these days of shortage of labour as well as high man-hour costs, it is essential that as many farm processes as possible should be achieved mechanically, and preferably simultaneously.

This paper describes the attachment of a modified fertilizer spreader, as previously described [1], to a tractor of the Farmall A. V. type. The general principles of the actual feeding of the fertilizer through the machine are similar to that of the machine previously described, although there are some differences, viz.:—

1. There are two rollers instead of one.
2. The channels in the rollers are parallel and not spiral as in the other machine, and
3. The machine is designed to be drawn by a high-clearance tractor, so that two sides of one row only are treated and not one side of each of two rows.

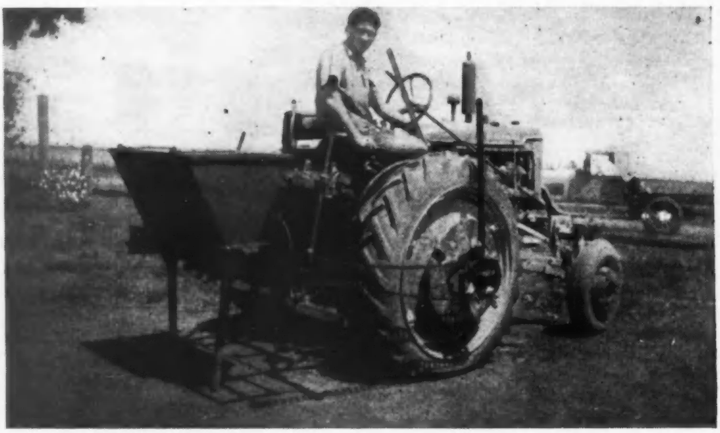

FIG. 41.—Illustrating the fertilizer distributor.

Description.

It is not necessary to mention any further details of the actual fertilizer feed, but delegates will no doubt be interested in the details of the attachment to the tractor, the chain drive and the performance of the machine in the field.

To date, the machine has been attached only to tractors of the Farmall A.V. type, but it would be a simple matter to utilize any tractor with mechanical lift, or even a tractor without. In the latter case it would be necessary to arrange some sort of a lift for the fertilizer tynes unless it were desired to apply the fertilizer as a top dressing.

The hopper with two rollers is attached rigidly to the back of the tractor by bolts through holes which already exist in the frame of

* Paper presented at the Mackay Conference, Q.S.S.C.T., April, 1949.

the tractor. The feeder roller is driven by a light chain attached to a sprocket on the right wheel of the tractor where a simple clutch can be thrown in or out by the right hand of the operator, without his leaving the driving seat. (See Figs. 41 and 42.)

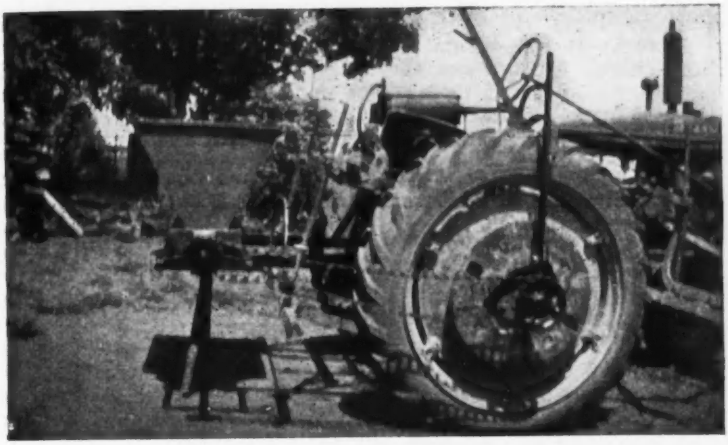

FIG. 42.—Another view of the distributor.

The fertilizer is fed through rubber hoses (similar to those in use in the ordinary fertilizer spreaders) and the lower ends of the hoses are loosely enclosed in two covering tynes but are of sufficient length to remain loosely attached to the sleeves of the tynes irrespective of whether the latter are in the "Up" or "Down" position. These light covering tynes are attached to the lift bar of the tractor and consequently can be raised for turning.

The machine has been used quite extensively in the Mourilyan and adjacent areas with pronounced success, one farmer having been enabled to scarify, fertilize, plant and cover peas in the one operation over twelve acres in one day. One big advantage is that when the operator throws out the clutch at the headland, no further fertilizer is fed through.

The two illustrations, taken in conjunction with those in the author's former paper [*loc. cit.*] will give some idea of the simplicity of the attachment.

Conclusion.

It is realized that this paper breaks no entirely new ground, but is a logical step from the principle of the previously described horse- or tractor-drawn fertilizer spreader, to bring it in line with the completely mechanized labour-saving policy so desirable under present-day conditions.

A further advantage is that it can be used for the application of "Gammexane" by a substitution of rollers and the author is quite certain it could be adapted for the inter-row planting of legumes as advised by S. W. Dickson [2].

REFERENCES.

[1] CAMUGLIA, G., 1947. "A New Type of Fertilizer Spreader." Proc. Q.S.S.C.T., p. 209.

[2] DICKSON, S. W., 1941. "Experiments in the Growing of Poona Pea amongst Sugar Cane." Proc. Q.S.S.C.T., p. 215.

History of Sugar in the Mackay District.*

By J. T. ELLIOTT and E. A. PEMBROKE.

Introduction.

ON 29th March, 1929, representatives of the sugar industry met in Mackay to inaugurate the Queensland Society of Sugar Cane Technologists. At the coming of age of the Society, which again meets in Mackay, it is fitting that some reference be made to the history of sugar in a district which has always been prominent in the advancement, along sound lines, of the Queensland sugar industry.

There is doubt as to where and when cane was first introduced into Australia, but in 1823 it was grown at Port Macquarie, New South Wales. Mention is made of cane cultivation in Brisbane in 1849, and Messrs. Spiller and Fitzgerald are credited with the first field plantings in the Mackay district, at Alexandra in 1863. Five years later the first mill was erected in the same locality, and during the first crushing ten tons of sugar were manufactured from two hundred tons of cane.

The infant industry made rapid progress, and in the early 1870's 3,436 acres were under cane in the district; mills were erected at Pleystowe, Branchcombe, Nebia, Dumbleton, Pioneer, Foulden and Casada, and eventually 35 small mills came into existence. These early factories were primitive affairs of wooden vertical rollers driven by either horses or oxen. Ruling prices for sugar for the ten years ending 1878 ranged from £20 to £35 per ton whilst the few small growers received 11s. per ton of cane.

From 1880-1890 further lands came under cane and the C.S.R. Company purchased a large tract of country in Homebush and erected a mill. It is interesting to note that, even at this early date, considerable areas of the poorer soil types were brought into production. The large plantation system was in vogue, cheap Kanaka labour was used and white artisans were reserved for the more important tasks. Towards the end of the century the plantation system rapidly declined, large areas were subdivided and worked by farmers, whilst the mills remained in the control of private owners. The divided interest within the industry caused unrest which resulted in a petition to Parliament and the introduction of the central mills in 1885. Mr. T. Pearce of Mackay is credited with initiating the movement, and the first two central mills in Queensland, at Racecourse and North Eton, were ready for operations in 1888. However, the Racecourse Mill directors, claiming that they would show a loss on operations deferred their initial crushing until 1889; North Eton, therefore, enjoys the distinction of being the first central mill to operate in the State, with a first crushing of 1,400 tons of cane to produce 100 tons of sugar. Incidentally the year's work was at a loss, and of the many central mills eventually erected, Racecourse was the first to clear its liabilities to the Government.

The central mill system was actually the forerunner of the White Australia policy, as under the relevant act only white labour could be employed. These mills also made considerable improvements in milling which, with better farm economy as practised by the small farmer-

*Paper presented at the Mackay Conference, Q.S.S.C.T., April, 1949.

owner, resulted in an increase of sugar manufactured per ton of cane crushed. In 1891, Racecourse reported a ratio of 1 to 9: the growers received 13s. 6d. per ton of cane, and the miller £12 6s. 5½d. per ton of sugar.

The Queensland sugar industry suffered its first major setback in the early 1890's. To offset low sugar prices and increased labour costs, the Government came to the rescue with The Sugar Works Guarantee Act in 1893. It is claimed that this Act saved sugar production in the Mackay district from complete extinction. Four more central mills, namely, Marian, Pleystowe, Plane Creek and Proserpine, were erected. During these trying times some incidents are amusing in retrospect; as an example, the Racecourse directors held a meeting to increase the manager's salary from £250 to £300 per annum. The meeting terminated in confusion and almost wrecked the directorate.

In 1906 Farleigh and Cattle Creek mills were ereced by private enterprise; later these became co-operative or farmer-owned, whilst Pleystowe later came under private management. These large manufacturing units sounded the death knell of the plantation system. There was a distinct transformation in the personnel engaged in the industry, and with closer settlement population rapidly increased.

Although taking an obvious interest in the milling side, the Governments of the day and others vitally interested in the industry during the period already reviewed did not neglect the agricultural needs. New cane varieties were imported from abroad and were first propagated in State nurseries, one of which was established in Mackay in 1893. However, at these institutions sugar cane was only one of many plants receiving attention; and in 1898, Queensland's first Experiment Station devoted wholly to sugar cane was opened in Mackay.

In the early 1900's strikes were not uncommon, and the using of white labour brought forth some labour saving devices. The most serious setback experienced in local cane culture during this period was in 1918 when a cyclone created considerable havoc and hardship to producers. Older growers still meditate on the devastation perpetrated by this cyclone. In January of that year 63.13 inches of rain fell in a week and the total for the month was 85.5 inches. Compare this torrential downpour with an average annual fall of 67 inches and it is not hard to visualise the resulting damage, especially when floods were backed up by high tides. Old inhabitants claim that at least 40 per cent. of the crop was completely destroyed and 6,000 tons of stored sugar irretrievably damaged. It was two years before a large proportion of the district returned to normal production.

Later great stimulus was given the sugar industry, not only in the Mackay district but elsewhere also, by the building of large sections of the South-North railway. A further milestone in Mackay history was the building of the power alcohol distillery at Sarina in 1926.

Having given a very brief general outline of the sugar history of Mackay it is now proposed to deal specifically and in more detail with some of the agricultural phases.

Seed Bed Preparation.

The majority of early land settlement was under the plantation system and coloured labour was employed in gangs under the supervision of a white overseer. These were the colourful days of the

industry. The plantations were almost self-contained units. With their churches, schools, abodes and stores under the control of one person they took on an old world appearance. Mackay first experienced the influx of the Kanakas in 1865 and the last of them were deported in 1906.

The earliest settlers naturally occupied the fertile alluvial soils of the Pioneer Valley and closely adjacent rain forest areas. Expansion to the poorer forest soils and the more distant better soils came later. Selected land was roughly cleared, light timber and undergrowth were burnt off, and the cane was planted with a mattock. After some years of volunteer ratooning the land was gradually cleared for ploughing.

Many of the ploughs were imported from England, and the early ploughmen were mostly European migrants. The deep short mouldboard and the adjustable mouldboard which could be attached to either side of the beam were most popular. Knife coulters were in early use but were replaced eventually by the disc types which are still popular to-day. As early as 1870, the Colonial bullock plough, manufactured in Adelaide, was used extensively for breaking up new lands. Of heavy construction and deep draught it required six horses or ten bullocks to deal with four acres per week.

Steam ploughs made their appearance on the larger plantations about 1875. Traction was by means of portable steam boilers, fitted with winding drums and steel cables, situated at the ends of fields. The ploughs were multiple mouldboards attached to heavy iron frames, and were suited only to the deeper soil types. When used on the shallow soils of one plantation, several inches of raw subsoil were brought to the top and cane could not be grown profitably on these fields for several years. At this time also several American ploughs were in operation; and a local manufacturer, N. P. Willman, produced ploughs which were highly esteemed.

The advent of white labour on small farms naturally increased production costs, and growers resorted to cheaper methods of ploughing. The multiple mouldboard and disc ploughs became popular. Horses were used for many years with these implements, but 1910 witnessed the advent of tractors to canefields. These "one man units" were applied vigorously to the job and, either pulling single discs as in the old "side plough" or three of four discs per drawbar, are at the present time supreme. Many of the ploughs to-day are designed and made locally.

Over the years deep ploughing to 10 inches for cane has not changed appreciably, and so far no good reasons, backed by sound evidence and local experience, have warranted a change. However, particularly during the past fifteen years the Mackay farmers' outlook on ploughing has changed considerably in other respects. Previously a certain number of ploughings was done irrespective of conditions encountered. Nowadays more enlightened work is done; soil moisture and soil structure are observed, over-ploughing and waste are avoided, and the work ceases when the best possible seed bed conditions are attained. Originally the rigid wooden peg harrow was the only implement other than the plough and roller, used in pre-planting operations. Eventually steel was used in its construction, then came spring tyne harrows, followed by disc harrows, and lastly the bumper

discs which are used almost universally throughout the Mackay district to-day. Several types of roller have appeared from time to time but the old durable wooden implement still does the work required of it on most farms.

It has always been realised in the Mackay district that for profitable cane growing excess water at certain times of the year must be removed from the shallow, light coloured, clay bottom forest soils. Comparatively cheap surface drainage by means of beds and lands has been practised for many years and has proved reasonably satisfactory. Although at times implements such as the mole drainer have been tried, the plough, the scoop, the leveller and/or grader remain the chief implement aids in the construction of drainage systems.

Planting.

In the early days cane was carted to the fields in drays, then stripped and cut into setts which were dropped by hand into drills made by the double mouldboard drill plough—an implement still operated occasionally. The Kanakas used their feet to bring the setts into close contact with the soil and, to promote quicker and more reliable germination, some care was taken to place the eyes in a horizontal position.

With general improvement in implements came the drop planter as developed by a Mackay grower. To delete the hand cutting of setts and to speed up planting operations, N. P. Willman, of Mackay, advertised a cutter planter during World War I. This, the prototype of the machines used almost universally throughout the central districts during the past decade, did not suit the economy of its time and never became popular. Following the modern trend of multi-row cultivation, two row cutter planters have been developed and for some years have been operated successfully on the larger farms.

Early in the evolution of planting machines fertilizer distributors were attached, and to-day drilling out, planting, fertilizing and covering are a composite operation.

The amount of cover considered necessary for good germination has not altered appreciably for many years, and various types of drill rollers and other methods of compacting soil are still used when required. However, with the advent of the "grass canes" and the reduction of the number of ratoons, modern planting operations are often designed to grow the crops higher in the soil.

Post-planting Cultivation.

For many years the swing plough, blade and forkhoes and the scuffler or scarifier covered most operations in young cane, and large gangs were employed on the work. Then came the "Cotton King" and spring tooth and spinner machines which in turn were replaced by the "Dictator" with its attachments the "Wiggle Tail" or "Cock's Comb." However, the light high clearance tractor, with direct suitable attachments working on the same agricultural principles of former days, has contributed the most recent and spectacular effort towards the intensive mechanisation of Mackay farms.

Harvesting.

The actual cutting of the cane has seldom varied in principle, although circumstances have sometimes caused slight and transient differences in methods used, and in the quality of the work performed. Under the small farm system of the Mackay district hand cutting is still universal, but on past occasions worthy attempts have been made to mechanise this important phase of cane production, and efforts along these lines are being continued. So far no reasonably permanent and extensive advance has been made.

The transport of cane to the mills has, through the years, altered considerably in operational details and in improvements in freshness of supply; this latter, despite the pre-harvest burning of nearly all fields. Drays and waggons have been replaced by truck waggons; first the iron wheeled vehicle of Willman's day and then the more recent pneumatic tyred and ball-bearing types. With continued improvement in roads, the use of motor vehicles for cane transport is expanding. Portable tram line has only limited uses under Mackay conditions. Recently a Mackay resident invented a lift which is an advance on the older methods of load transfer at certain sidings. Mill tramline systems have expanded with the district, but considerable tonnages of cane are still carried to the mills by Government railways.

Ratooning.

Weeds were more or less allowed to compete with the volunteer ratoons of early days. For over half a century the swing plough, hoes and scufflers were the chief ratooning implements. Stubble shavers and stubble diggers were imported and locally made subsoilers were tried in ratooning operations but were quickly discarded. Nowadays disc harrows or bumper-discs and special cut away ploughs attached to tractors are commonly used. Perhaps there is a modern tendency towards less pruning of the stools and generally shallower cultivation of ratoons.

Fertilizing.

It is recorded that prior to 1900 the only artificial fertilizer available to Mackay growers was bonedust. Later, "straights" with nitrogen and potash appeared; and mixtures along modern lines came into existence about 1920. By this time improved fertilizer distributors, some of them designed and made locally, were also available.

Generally little fertilizer was applied to cane in the Mackay district until the 1930's. At the present time plant cane is often well fertilized, although probably insufficient attention is given to the economics of the project. Ratoons are frequently supplied with dressings of nitrogen only.

Varieties.

In 1877 M. J. Davidson of Alexandra compiled a list of 29 popular varieties grown in the district, and stated that the total number in existence would exceed one hundred. From 1874-1914, 430 varieties were imported from several countries; of these, Badila and D.1135 are still grown commercially, and older growers are familiar with Striped Tanna, Cheribon, Otamite, Mahona, Meera and Palmyra. These canes gave way to the importations, E.K.28, M.1900, Co.290, the P.O.J.'s and the Queensland canes Q.813 and H.Q.426. In 1945 the first locally

selected original seedling Q.28 became the major variety in the Mackay district, and on present indications another local seedling in Q.50 will soon constitute a large portion of the crop.

Conclusion.

From the nucleus of a small area of cane planted in 1863 a prosperous district has developed, and now extends to Proserpine in the north, south to Kalarka, and some 45 miles inland. A total gross assignment of 147,586 acres supports 2,230 growers and 8 mills, and produces a quarter of the Australian sugar crop. The district average tonnage of cane per acre is not high since the predominating soil types are of poor fertility. There has always been a fairly narrow and persistent margin between economic survival and extinction. This is no doubt the fundamental reason why those engaged in and associated with sugar in Mackay have been careful with unsubstantiated theories, have been intensively practical, quick to initiate, develop and employ new ideas and practices of solid worth, and above all have been prepared to do their share of work in solving the many difficult problems which have confronted them in the past.

To the early pioneers of the industry, millers and growers alike, to those who took all the risks of an unknown industry, a large proportion of credit is truly due, as we—the present generation—connected with this important industry are merely following in their footsteps equipped with better scientific facilities and a knowledge gained from their frequent failures and heartburnings.

Acknowledgment.

The authors have made extensive use of "An Historical Review of the Queensland Sugar Industry" by Harry T. Easterby (1932); and are also indebted to many farmers for information and useful suggestions.

IRRIGATION WATERS BULLETIN.

A Technical Communication entitled "Irrigation Waters of the Bundaberg Area" has been recently issued by the Bureau of Sugar Experiment Stations. This deals in a technical manner with the underground supplies of that district and gives tables of analytical data connected with the various water supplies.

This publication is available free of charge to any person requesting it. Requests should be addressed to the local Sugar Experiment Station or to the Bureau of Sugar Experiment Stations, Brisbane.

What are Plant Hormones?

By NORMAN J. KING.

THE very recent developments in the field of so-called plant hormones and the publicity given to these substances in agricultural literature make desirable a brief explanation of how and why these compounds became of such particular interest and to what extent they are likely to affect the Sugar Industry.

The presence of hormones in the animal kingdom has been recognised for a considerable time and most people are now aware that the function of certain special glands is to produce small quantities of hormones the over abundance or short supply of which has far reaching effects on our bodily behaviour. In the plant world, however, other hormones are manufactured within the plant itself—not in special glands but in the buds or growing point and these substances possess the property of affecting the physiological processes in other parts of the plant. Certain of these plant hormones have been isolated from the plants in a pure form, and chemical science has enabled their manufacture synthetically, and those and other chemicals with similar properties are now being used commercially to obtain certain desired effects on growing plants or cuttings. Such substances are generally known as plant hormones or auxins.

In animals the various hormones produced by glands have specialised functions, and control with a considerable degree of precision a specific bodily process. The plant hormones, by contrast are not so specific in their action and by using various concentrations or methods of application quite different effects can be obtained on a given plant species. For example, the synthetic hormone-like substance 2, 4 dichlorophenoxyacetic acid (which is now well known as 2:4D) can produce quite a variety of effects on certain plants. If a very minute quantity be applied to one side of the stem of a bean plant the plant cells along the treated side grow more quickly than those on the opposite side thus causing the plant to bend sharply away from the treated area. An increased amount of 2:4D applied similarly results in movement of food material within the plant towards the treated area; new cells are formed and these arrange themselves in such a way as to produce root primordia and eventually roots develop on the outside of the stem even when no soil is in contact. On the other hand, if the aboveground portions of the bean plant are sprayed with 2:4D the effect is different again. Firstly, leaf growth ceases and the rate of respiration increases; the reserve food supply in the plant then breaks down and the plant literally starves to death. It is this latter property which is exploited in using 2:4D as a selective weedicide. Only certain plants are affected by 2:4D and these do not include the graminaceous plants to which belong the grasses, the cereals and sugar cane. The value of 2:4D is therefore apparent in killing certain weeds in fields of wheat and sugar cane or in pastures and lawns.

There are many other commercial applications of synthetic plant hormones and in the short time since their properties were first recognised their use has been of substantial benefit to general agriculture. Perhaps one of the most interesting and spectacular applications has been in the prevention of fruit fall. During the ripening of some fruits a weakness develops in a portion of the stem close to the branch of the tree. This loss of strength frequently results in the fruit falling from the tree before it is ready for harvest, thus involving the

grower in considerable monetary loss. The use of one of the plant hormones (naphthalene acetic acid) as a spray at about the time when fruit fall is expected prevents the weakening of the stem for a further week or two. More recently 2:4D used as a dilute spray at a strength of 1 in 1,000 has proved even more effective and has resulted in delaying the dropping of fruit for a considerably longer period.

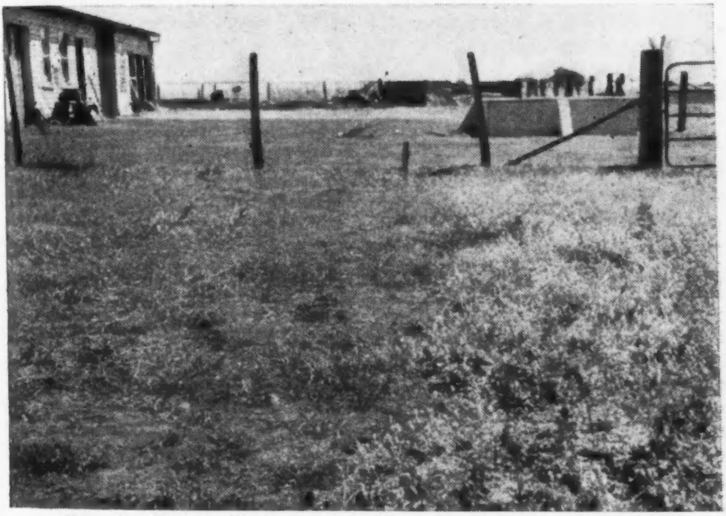

FIG. 43.—The result of spraying with 2:4D. The paddock was infested with the weed *Gomphrena recumbens* (known as White-eye). The weed-free area on the left received a single spraying—that on the right was untreated.

Horticulturists and nurserymen have taken full advantage of another property possessed by certain of these plant hormones—the promotion of rooting in cuttings. Certain plants of considerable economic importance can be rooted only with difficulty under normal conditions and thus propagation in large numbers is delayed on that account. Plant cuttings which normally root well will frequently strike even faster after standing for a period in a plant hormone solution, while those which root with difficulty can generally be made to produce roots more readily than without the treatment.

The pineapple industry has also benefited from the use of plant hormones which are used to promote flowering and fruiting. For some years past the flowering of pineapple plants has been accelerated by treatment with solutions of acetylene gas but it is now found that a weak solution of one of the plant hormones has the same effect and eliminates the trouble involved in the older method of preparing the gas solution.

Applications in the Sugar Industry.

The commercial applications of hormones mentioned above would appear to be of only limited interest to cane growers, with the exception of the use of 2:4D in weed control. Even here the value, at first sight, appears to be more theoretical than practical because 2:4D kills only certain broad leafed weeds and does not affect true grasses which constitute the principal "weed" problem in cane fields. However, the discovery of the pre-emergence effects of 2:4D have changed the picture entirely. It is now known that although 2:4D will not kill

growing grasses, it will, if sprayed on the soil surface, prevent the development of both grasses and weeds after the seeds germinate. The economic importance of this property is obvious and early trials have demonstrated that a single spraying of the soil after planting of cane prevents development of weeds and grasses for at least two months. Much confirmatory work is essential, but the method holds out much promise.

The Bureau is carrying out field trial work associated with pre-emergence spraying for weed and grass control and a considerably enlarged programme is planned with tractor spray equipment during the coming summer.

Some years ago a series of experiments was carried out to test the effect of hormone solutions on the rooting of sugar cane cuttings. The plants were soaked for varying periods in the solution of recommended strength but there was no apparent acceleration or improvement in root formation. Sugar cane cuttings, unlike cuttings from hardwood plants, have their root primordia already developed, so it was not expected that similar results in root promotion would be obtained with sugar cane. Moreover, even though good results had been achieved they would have been of little value to the sugar industry. Sugar cane normally roots very well so long as soil moisture and temperature conditions are favourable for planting and there is no problem associated with rooting. A hormone which would promote bud development would on the other hand be of considerable value to the industry as any marked improvement in strikes would save considerable amounts annually spent on supplying gappy stands. To date, however no product with this property has been discovered.

In this connection it is of interest to record that investigational work on hot water treatment of cane plants by Brandes and Van Overbeck has shed a new light on the improved germination obtained by this practice. The immersion of cane plants for 20 minutes in water heated to 52°C. has been carried out in Queensland for some years when it is necessary to ensure freedom from chlorotic streak disease. It was noticed that improved and accelerated germination resulted from the hot water treatment but the reason was not clear. Brandes and Van Overbeck have shown as the result of much detailed investigation that bud developments may be inhibited by a plant hormone or auxin present in the cane stalk and that the hot water treatment probably brings about a reduction in the amount of this auxin thus allowing speedier and more reliable development of the buds. It must not be considered that all hormones speed up growth processes. Hormones are rightly known as growth regulators and the function of this particular one is apparently to prevent side bud development while the stalk is growing.

A hormone which would allow of arrowing to be regulated in a similar manner to the promotion of flowering in the pineapple plant would be of value to the cane breeder. Many desirable crosses are difficult or impracticable because certain varieties arrow much earlier than others and the combinations cannot be made. There are also certain desirable parents such as B.208, Oramboo and M.1900 which rarely flower. Work is planned to find out whether applications of hormone to the spindle will promote arrowing and the results will be awaited with interest.

Plant hormones are still in their infancy but much commercial value has already accrued in certain branches of agriculture and horticulture. The next decade may see even more startling advances.

Progress of "Gammexane" Trials.*

By G. WILSON.

WHILST the large scale use of "Gammexane," when applied as recommended by the Bureau of Sugar Experiment Stations, has been effecting very satisfactory control of greyback grubs it has to be realized that trials are still being carried out concurrently to find out more effective methods and more economical quantities. This summary of the results of trials observed and harvested during 1948 is intended to keep those interested advised of the latest developments. Canegrowers usually apply "Gammexane" during the months from July to November at the same time as the Bureau's most recent trials are being harvested and reports thereon correlated. Canegrowers order their supplies and make their field applications in accordance with information obtained during the previous year; therefore they must not be surprised if slight changes in recommendations appear in publications shortly after they have applied their "Gammexane"; this is the obvious result of an intensive experimental programme which is constantly yielding fresh information. The methods of application and quantities mentioned in this paper refer to the cane areas of Cairns, Innisfail and Tully. Field practice may require modification under different conditions of climate or cultivation, or perhaps on soil types not encountered in North Queensland.

Method of Application.

Trials in which "Gammexane" has been broadcast all over the field surface compared with the same quantity per acre applied in a 20-inch band along the cane row show that approximately three times the quantity per acre is required broadcast to give results equal to the concentrated band. Therefore, in large scale field application the "Gammexane" should be laid in a band of the most suitable width as determined by successful, controlled experiments—at least this should hold until other methods have been similarly tested.

The machines that have been used all have the same good feature that they measure out a suitable quantity of "Gammexane" per acre. Their usefulness in applying a correctly placed band of "Gammexane" depends on how they deliver the "Gammexane" relative to the state of cultivation of each individual field, and the possibilities of subsequent soil movement. The future development of such machines should tend towards making them suitable to deal with varying states of field cultivation, since factors will continue to operate which will prevent all "Gammexane" being applied precisely at the ideal time. In this regard the objective in the immediate future should be to have a machine that will concentrate the "Gammexane" within a 20-inch band so that big cane in which the interspaces have been worked down can be properly treated without the necessity of considerable soil movement to bring the "Gammexane" into the cane row.

Some machines which are used for applying "Gammexane" have a gap of approximately fourteen inches right over the cane row on which no "Gammexane" is delivered. The "Gammexane" is dropped in a ten inch wide band on either side giving a total initial spread of thirty-four inches. This method depends on considerable subsequent soil movement to bring any great proportion of the "Gammexane" immediately on top of the stool, especially because wheeled machines

* A paper presented at the Annual Conference of Cane Pest and Disease Control Boards.

do not run particularly straight and some of the "Gammexane" lies outside the distance stated above. This can be effective if the interspaces are fairly well hilled up, and if the application is made early on loose friable soil which can be readily moved. However, if the "Gammexane" is applied when the interspaces have been worked down, or when the soil is compacted and dry, very little may be brought into the cane row. It is recommended that at least two of the delivery holes at each outer end of such machines be blocked off and the delivery concentrated nearer the stool. If the type of machine used were such that the dust could be applied at an early stage in cane growth right across the stool in a band 18 to 20 inches wide, the "Gammexane" would be concentrated over the area where it is most effective.

In this position it would be least disturbed by ratooning during the following year and since "Gammexane" has been proved to have a high residual toxicity, as outlined below, this point may be of some importance. A deeper more concentrated band may prove to be more effective against frenchi grubs which at present are being studied as a separate problem. The general rule to be observed is that "Gammexane" should be applied early so as to avoid the nuisance of large cane and so that the slope of the open drill may serve to facilitate the movement of the "Gammexane" in towards the cane. On the other hand it must not be applied so early that subsequent drill cultivation will be outwards and thus move the "Gammexane" away from the cane. It might seem unnecessary to give such advice, but it has happened within the last year that cane was damaged by grubs because the "Gammexane" immediately after application, was scooped out of the drill with a cotton king discing outwards. Owing to the peculiar fertility and soil type of the field concerned no further cultivation was done, and the "Gammexane" was mostly heaped up in the centres where it proved quite ineffective.

Quantity.

With respect to the efficiency of "Gammexane" for the plant crop alone, the rate of 50 lb. per acre was unsatisfactory even on fairly heavy schist soil with moderate grub infestation. In this case some signs of grub damage appeared before harvesting, although seasonal conditions prevented the development of significant losses. Adequate protection was given by 75 lb. per acre in those experiments, in which grub infestations were only moderate in relation to the soil types concerned. However, recent trials indicate that "Gammexane" has considerable residual toxicity in the second year after application and the quantity to be applied to the plant crop has now to be considered as part of a two year programme. The 1947 recommendations of 75 lb. per acre on heavy soils and 100 lb. per acre on light soils were based on the amounts known to be necessary to protect **plant** crops under normal conditions. It was not known then whether the "Gammexane" would last in the soil beyond one crop but it was anticipated that there might be some residual toxicity which could be brought up to an effective level by supplementary light applications to the first ratoons: Retreatments of 50 lb. per acre on first ratoons were therefore applied in trials late in 1947 alongside un-retreated cane that had received similar or heavier original plant dressings.

Owing to light grub infestations in many of these trials sharply defined conclusions were not obtained but two heavily infested trials gave clear evidence of residual effect in cane which had not been retreated.

The following grub counts made in Badila first ratoons in May, 1948, when adjacent untreated cane was approaching the death point, illustrate residual toxicity:—

Rate per Acre Applied in Previous Crop.	Greyback Grubs per Stool.	Damage to Cane.
Lb.		
0	11	Cane near death point
12½	12	Cane almost as bad as above
25	8	Cane almost as bad as above
50	4·5	Very considerably damaged
75	1·5	Considerable control but some damage
100	0·5	Very slight patches of damage
125	0·5	No signs of grub damage
150	1·0	No signs of grub damage
200	0·5	No signs of grub damage

The above applications had been made on the plant crop of the previous year, in which no observable grub damage took place. The first ratoons had not been retreated.

In a harvested 5 x 5 trial (variety Cato) the yields of untreated first ratoons which had 0, 100, 150 and 200 lb. per acre applied in the plant crop were as follows:—

Treatment Rate per Acre.	Plant Cane, t.p.a.	First Ratoon, t.p.a.
0 lb. (10 plots)	27·0	27·5
100 lb. (5 plots)	28·0	34·1
150 lb. (5 plots)	28·8	35·8
200 lb. (5 plots)	28·8	34·9

The year under review was not favourable to the incidence of severe tonnage losses because the beetle-flight was very late and grub damage developed after the crop was well grown; good growing conditions accompanied the period during which the greatest loss of growth usually takes place. Consequently the actual loss of cane in the 5 x 5 trials was less than it might have been. On this basis and in view of the presence of slight grub patches at the 100 lb. level in the observational Badila trial it is deemed advisable to recommend a plant cane application of 125 lb. per acre on light or medium soils to protect two successve crops. This might be reduced to 100 lb. per acre on the heavier soils or where heavy grub losses are not expected.

"Gammexane" was found to be effective on ratoons that had not been previously treated. It was successful when applied in a furrow three to four inches deep on each side of the cane row at the rate of 75 lb. per acre on heavy soils and 100 lb. per acre on medium or light soils. As was to have been expected from results in plant crops, broadcasting was found to be much less effective than placing in a furrow.

The effect on grubs in the second ratoon crop of "Gammexane" applied to first ratoons has not yet been determined. The removal of soil from the stool by ratooning might have a bearing on this.

Extensive trials which have been laid out during 1948 on plant cane are designed to investigate the effect of "Gammexane" over three normal crops, plant, first and second ratoons. Quantities ranging from 75 to 150 lb. per acre will be applied either as one initial dressing on the plant cane or split into two dressings on the plant and first ratoons. At present it is intended to rely on residual toxicity in these trials to protect the second ratoons.

The effect of "Gammexane" in the third year after application, i.e., on second ratoons, has yet to be found out.

A most important effect of the prevention of grub damage in plant or first ratoon crops is the amazing difference in the ratooning vigour of the undamaged stools quite apart from any protection afforded against later grub infestation, a point which has been dealt with more fully by Mr. Buzacott.

The study of control of two-year cycle grubs such as frenchi, consobrina and caudata, has not achieved the same degree of progress as that of greyback grubs because of lack of suitable heavy populations during the years that "Gammexane" has been under trial. Trials have been set out in which "Gammexane" has been applied in various amounts and by different methods, including that of mixing it with fertilizer and applying it in the drill below or above the plants. These studies are not sufficiently advanced to supply clear cut information.

Trials in which "Gammexane" was disced or ploughed into the soil at rates from 50 to 200 lb. per acre have shown this to be less effective for greybacks than drill applications; frenchi infestation has been lacking in these trials. At the rate of 200 lb. per acre "Gammexane" ploughed in before planting, has shown very strong residual value against greybacks in first ratoons with consequent vigour in the young second ratoons. Trials at lower rates have yet to go through the ratoon stages.

STORAGE OF COWPEA SEED.

Stored cowpea seed may be attacked by insects, chiefly weevils, and farmers would be well advised to take precautions against the deterioration of sound seed. This may be done by treating each bushel of seed with two ounces of a dust containing 2 per cent. D.D.T. Treatment must be carried out before the seed is damaged to any extent, and it is essential that each seed should receive a uniformly fine coating of dust by thorough mixing of seed and dust. Seed treated with a D.D.T. dust can be stored in bags, as this insecticide gives permanent protection against reinfestation if the dust is efficiently applied.

Variability and Contamination in "Gammexane"* Supplies.

By R. W. MUNGOMERY.

DURING last season when "Gammexane" dusts were being applied to fields in North Queensland to afford them protection against anticipated grub infestations, it was learned that difficulties were sometimes being experienced in applying the dusts at the rates recommended by the Supervisors of the various Boards. These difficulties were apparently due in some instances to the varying qualities of the rock phosphate dust which was being used as a diluent, and also to the extraneous matter that was sometimes found in the dust. In other instances the "Gammexane" dust was found to be damp or wet and this, of course, caused considerable trouble in having the material dried out, broken up, and sieved so as to restore it to a condition approaching its original consistency.

In consequence all Boards who purchased "Gammexane" dust were circularized regarding this matter and they were asked to submit details of any disabilities they had encountered with the application of this insecticde, so that their complaints could be taken up direct with the manufacturer with a view to improving the product that was being supplied. From the replies received it was ascertained that in addition to the extraneous matter previously referred to, some of the "Gammexane" dust had arrived in a wet condition over the past two years. Subsequent correspondence with the company concerned elicited the information that the different batches of dust were invariably packed in a dry condition in dry containers at Melboure, and that these containers or drums were not carried as deck cargo. Therefore it seemed logical to infer that water gained entry into drums after their discharge at North Queensland ports. Enquiries revealed that some consignments were transported from the wharves to their destinations in uncovered trucks and that rain had occurred during this period. It is thought that hot conditions caused an expansion and escape of gases from the drums, and with their cooling subsequent to the downpour a partial vacuum was formed. Water was then sucked in from the sunken depression around the lid where it had collected. At the present time it is not possible to obtain drums with lids which fit completely over the top, so it is recommended that drums when stored or transported should be inverted and stacked with their lids on the bottom, so as to prevent the entry of water as outlined above. The extraneous matter present in the dust included small pieces of unground rock phosphate, fibre, string, bagging, labels, paper, wax, dead matches and dead mice! The presence of the pieces of unground rock phosphate was unfortunate because in some instances they were responsible for the breaking of pins in the metering apparatus of fertilizer distributors. On other occasions these pieces and the other foreign substances blocked the outlet holes and caused an uneven delivery of the dust. It is considered that the fitting of suitable screens and the use of clean containers will eliminate these contaminants and prevent a recurrence of these troubles.

With regard to the quality of the various consignments of dust, it became apparent because of differences in weight/volume ratios,

* A paper presented at the Annual Conference of Cane Pest and Disease Control Boards.

that rock phosphates of varying fineness and from different sources were being used. One can appreciate the difficulties which supervisors encountered in adjusting the discharge rates from various implements, and their feelings when they discovered that the settings had to be altered when a subsequent consignment of a different grade was delivered to the same farm. It is understood that the company now proposes to draw a standardized supply from the one source in future.

FORECAST OF APPROVED VARIETIES FOR 1950.

In accordance with usual practice, the Bureau has prepared a forecast of the changes it is proposed to make in the approved variety list of 1950. Any interested farmers' organisations which consider alterations should not be made along the lines indicated, or wish to submit any other changes, are invited to submit their views to the Director of Sugar Experiment Stations before 30th November, 1949. Any objections against varietal deletions or suggestions for additions must be accompanied by a detailed statement of the reasons for such objections or suggestions. No action can be taken in respect of late or unsubstantiated requests.

Mossman—Q.10 to be deleted. Q.50 to be added.

Hambeldon—Q.50 to be added.

Musgrave (North of Figtree Creek)—Q.10 and B.147 to be deleted. H.G.426 and Pindar to be added.

Mulgrave (Babinda District)—Q.10, B.147 and D.1135 to be deleted. Pindar to be added.

Mulgrave (South of Russell River)—Q.10 to be deleted. Pindar to be added.

Babinda—Q. 10, B.147 and D. 1135 to be deleted. Pindar to be added.

South Johnstone—Q.10 to be deleted.

Mourilyan—Q.2, Q.10 and Pompey to be deleted.

Tully—Q.2, Q.10 and Q.813 to be deleted.

Invicta (Ingham Line)—Pindar to be added.

Invicta (South of Townsville)—Pindar to be added.

Pioneer—Pindar to be added.

Kalamia—S.J.4 to be deleted. Pindar to be added.

Inkerman—S.J.4 to be deleted. Pindar to be added.

Cattle Creek—D.1135 to be deleted.

Racecourse—D.1135 to be deleted.

Farleigh—D.1135 to be deleted.

North Eton—D.1135 and H.Q.285 to be deleted.

Marian—D.1135 to be deleted.

Pleystowe—D.1135 to be deleted.

Plane Creek—D.1135 to be deleted.

Bingera—Q.50 to be added. Q.28 to be deleted.

Fairymead—Q.50 to be added. Q.28 to be deleted.

Millaquin—Q.50 to be added. Q.28 to be deleted.

Qunaba—Q.50 to be added. Q.28 to be deleted.

Gin Gin—Q.50 and Co.301 to be added. Q.28 to be deleted.

Isis—Q.50 and Q.51 to be added. Q.28 to be deleted.

Maryborough—Q.28 and Q.813 to be deleted. Q.47 and Co.301 to be added.

Mount Bauple—Q.28 and Q.813 to be deleted. Q.47 and Co.301 to be added.

A. H. Tucker, Government Printer, Brisbane.